SEED AND SOIL TREATMENT AND SPRAY CALENDAR

FOR INSECT PESTS AND PLANT DISEASES.

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Agricultural Experiment Station

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BULLETIN

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CALENDAR FOR TREATMENT OF PLANT DISEASES AND INSECT PESTS.

PREPARED BY W. J. GREEN AND A. D. SELBY.

This calendar for the treatment of diseased conditions in plants is designed to cover the needs of farmers and horticulturists. It was first prepared at the request of the Ohio Horticultural Society. Fungicides and insecticides may often be combined in spraying, and, where Bordeaux mixture is used for fungus diseases, this practice is recommended. Spraying young orchards with Bordeaux mixture from time of planting, and of stocks in nursery row, is strongly recommended to preserve healthy conditions.

REMEDIES.

FUNGICIDES.

1 **Bordeaux Mixture I.**

Copper sulfate (*blue vitriol*) 4 pounds.
Quicklime (*not air slaked*) 4 pounds.
(Or dry air slaked lime or hydrate of lime one-fourth more.)
Water to make 50 gallons.

Dissolve the copper sulfate in about two gallons of hot water, contained in a wooden vessel, by stirring, or even better by suspending the sulfate, contained in a cheese cloth sack, in a large bucketful of cold water. With the cold water and cheese cloth bag a longer time is required. Pour the sulfate solution into the barrel or tank used for spraying, and fill one-third to one-half full of water.

Slake the lime by addition of a small quantity of water, and when slaked cover freely with water and stir. Pour the milk of lime thus made into the copper sulfate, straining it through a brass wire strainer of about 30 meshes to the inch. Pour more water over the remaining lime, stir and pour into the other; repeat this operation until all the lime but stone lumps or sand is taken up in the milk of lime. Now add water to make 50 gallons in the tank. After thorough agitation the mixture is ready to apply. The mixture must be made fresh before using, and any left over for a time should be thrown out.

2 Bordeaux Mixture II.

Copper sulfate, 2 pounds.
Quicklime, 2 pounds.
(Or dry air slaked lime or hydrate of lime one-fourth more.)
Water to make 50 gallons.

For use on such trees as have foliage injured by Bordeaux I.

STOCK SOLUTION AND LIME PUTTY.

A solution of copper sulfate, containing say one pound of sulfate to the gallon of water, may be made up and permitted to stand indefinitely in a covered barrel if no lime is added. Such a solution is known as a stock solution and two or four gallons of this stock solution, according to the strength desired, is taken for each 50 gallons of the mixture to be made. For extensive spraying, a long trough or box of uniform width may be used, in which to slake and keep the lime. The quicklime is weighed out according to the amount needed, immediately placed in the trough and slaked with a small quantity of water. The whole is evenly spread and covered as a putty with water to exclude the air. This putty may be removed in calculated portions, placed in a tub and treated like the freshly slaked lime. By means of stock solution of copper sulfate and the lime in putty state, much valuable time is saved in filling the barrels or tanks used in spraying.

3 Ammoniacal Solution of Copper Carbonate.

Copper carbonate, 6 ounces.
Ammonia, about 3 pints.
Water, 50 gallons.

Dissolve the copper carbonate in the ammonia and add the water.

Caution—Use no more ammonia than is required to dissolve the copper carbonate. Ammonia is variable in strength, and the amount required must be tested in practice.

To make copper carbonate: Dissolve ten pounds copper sulfate (*blue vitriol*) in ten gallons of water, also twelve pounds of carbonate of soda in same quantity of water. When cool, mix the two solutions slowly, stirring well. Allow the mixture to stand twelve hours and settle, after which pour off the liquid. Add the same quantity of water as before, stir and allow to stand the same length of time. Repeat the operation again, after which drain and dry the blue powder which is copper carbonate.

4 Soda Bordeaux Mixture.

Copper sulfate, 4 pounds.
Commercial caustic soda, soda lye, (*sodium hydroxid*) slightly in *excess* so that mixture is alkaline—according to strength, 1 lb. 5 oz. to 1 lb. 8 oz. by testing.
Water to make 50 gallons.

To use instead of ammoniacal copper carbonate.

Warning—In each case of change of grade or brand of commercial caustic soda it will be necessary to test the strength. Keep the mixture well agitated. (See Bulletin 130.)

TO TEST THE STRENGTH OF CAUSTIC SODA.

Provide material and appliance described in Bulletin 130 and test carefully the reaction with both red and blue litmus. It is not safe to use this mixture without testing each lot of caustic soda used.

To keep caustic soda—After opening a container and testing, weigh out the entire contents into portions such as are needed to make a single spray tank of mixture; put in Mason jars under shelter, cover with a pint or so of water, and this portion is ready to be used as needed. Opened packages of caustic soda will absorb water and increase in weight on standing; unopened packages will usually keep for a year or more.

5 Potash Bordeaux Mixture.

Copper sulfate, 4 pounds.
Caustic potash, potash lye, (*potassium hydroxid*) 1 lb. 5 oz. to nearly 1 lb. 8 oz. as necessary for *slight excess*. (See soda Bordeaux.)
Water to make 50 gallons.

For use like soda Bordeaux mixture instead of ammoniacal copper carbonate.

Caution—Prepare like soda Bordeaux, only after test of the strength of the caustic potash.

6 Copper Sulfate Solution.

Copper sulfate, 4 pounds.
Water to make 50 gallons.

Dissolve the sulfate as directed in Bordeaux I.

Caution—The solution will injure foliage. It can be used only before the buds open.

7 Potassium Sulfid Solution.

Potassium sulfid (*liver of sulfur*) 1 ounce.
Water, 3 to 4 gallons.

This solution will not remain unchanged. The potassium sulfid must be kept in a well stoppered bottle. This may be made by a similar process to that of No. 8.

8 Sodium Sulfid Solution.

Commercial caustic soda, 2½ lbs.
Flowers of sulfur, 5 lbs.
After solution, water to make 50 gallons.

To make sodium sulfid at lowest cost: Place the caustic soda in a metal vessel and add a little hot water. Then stir in sulfur gradually, adding meanwhile hot water or applying heat. The chemical reaction will generate heat. With its progress the color will change from yellow to nearly brick red. No heat is required after complete solution unless lime be added. Don't add excess of water until the solution is effected. It may be made in quantity with external heat and kept during a day as stock solution. Excess of lime may be added with double or triple portion of sulfur to make the possible equivalent of lime, sulfur and salt solution.

Caution—This solution is prepared for application on dormant trees. Care must be observed.

Upon foliage, as of peach, a strength greater than 1 lb. caustic soda to 2 lbs. sulfur is not to be recommended.

To make sodium sulfid for *treating seed potatoes*, use at the rate of 1 lb. caustic soda to 10 oz. sulfur for 36 gallons of solution.

9 Calcium Sulfid (Lime Sulfid).

Quicklime, 1 to 2 pounds.
(Or dry air slaked lime or hydrate of lime, one-fourth more.)
Flowers of sulfur, the same amount.
Water, 50 gallons.

Proceed as directed for first steps in making lime, sulfur and salt mixture. Heat till the color has become red, showing the formation of the lime sulfids. This will require an hour or more. Dilution while warm is to be preferred, but the solution should cool somewhat before applying on foliage.

Caution—While this may be used on the peach in foliage, and upon other fruits, care should always be exercised in the preparation to avoid injury to the foliage from the application.

10 Formalin.

For oats and wheat, 1 lb. formalin to 50 gallons of water.
For potato scab and rosette, ½ pint of formalin to 15 gal. water.
For onion smut, 1 lb. of formalin to 25 or 33½ gallons of water.

INSECTICIDES.

11 Kerosene Emulsion.

Dissolve one-half pound hard soap in one gallon of water (preferably soft water) and while still boiling hot, remove from the fire and add two gallons of kerosene. Stir the mixture violently by driving it through a force pump back into the vessel until it becomes a creamy mass that will not separate. This requires usually from five to ten minutes. The emulsion is then ready to be diluted with water and applied. For the common scale insects and hard bodied insects, like the chinch bug, use one part emulsion to eight to ten parts of water. For soft bodied insects (plant lice, etc.), use one part emulsion to fifteen or twenty parts water.

Kerosene emulsion kills by *contact*, and therefore the application should be very thorough. It may be used against a great many different pests, but is especially valuable for destroying those with sucking mouth-parts, for they cannot be killed with arsenical poisons.

Caution—Only the dilute emulsion, 1 part emulsion to 15 or 20 of water, should be used when the trees are in leaf, and in all cases it should be kept thoroughly stirred; otherwise the foliage or even the twigs will be injured.

12 Paris Green.

In combination with Bordeaux mixture, Paris green may be used at the rate of one pound to 175 to 200 gallons.

When Bordeaux mixture is unnecessary, the Paris green may be used at the same rate, but two or three pounds of freshly slaked lime must be added to prevent burning of foliage. Keep the mixture well stirred so that the poison will be distributed evenly.

In cases where successive sprayings are necessary it is important to consider the accumulation of the poison and use a slightly weaker mixture, unless sufficient rain has fallen to wash off the poison thoroughly.

13 Arsenate of Lead.

Arsenate of soda, 4 ounces.
Acetate of lead, 11 ounces.
Water, 16 gallons.

Dissolve each separately in two quarts of warm water; mix and add water to make sixteen gallons. Arsenate of lead can be purchased from Swift Bros. Insecticide Co., Boston, Mass., or under the name of Disparene from Bowker Insecticide Co., Cincinnati, Ohio. It should be used at the rate of three pounds to fifty gallons of water. It is perhaps the best of the arsenical poisons in adhering qualities. This material may be used alone or in Bordeaux mixture.

14 London Purple.

If desirable, London purple may be substituted for Paris green, but it has the disadvantage of being somewhat variable in composition and containing more soluble acid. For the latter reason use it somewhat weaker, or else with an abundance of lime, so as to prevent burning of foliage, or in Bordeaux mixture. It has the advantage of not settling as readily as Paris green.

15 White Hellebore.

Hellebore is often employed in cases where arsenical poisons would be objectionable. Use one ounce to three gallons of water.

16 Pyrethrum.

Pyrethrum is usually applied as a powder, with a bellows, but may be used as a spray at the rate of one ounce to two gallons of water.

17 Whale Oil Soap Solution.

Use from one to two pounds of the soap to one gallon of water. Be sure that the soap is thoroughly dissolved, and then apply in the form of spray.

18 Arsenite of Soda.

Dissolve two pounds of commercial white arsenic and four pounds of carbonate of soda (washing soda) in two gallons of water and use one and one-half pint to a barrel of Bordeaux mixture (50 gallons).

The easiest way to make the solution is to put both the white arsenic and carbonate of soda in a gallon of boiling water and keep boiling about fifteen minutes, or until a clear liquid is formed, and then dilute to two gallons.

Caution—This cannot be used alone safely, but must be applied in Bordeaux mixture.

19 Crude Petroleum.

Caution—Use a fine nozzle and exercise great care to avoid overspraying. It requires a careful workman to spray peach trees with crude petroleum, as too much of the material, especially on the bodies of the trees, is likely to do harm. Lime-sulfur-salt is quite as efficacious and safer to use than crude petroleum.

20 Lime, Sulfur and Salt.

Stone lime, 15 to 30 lbs.
(Or dry air slaked lime or hydrate of lime one-fourth more).
Flowers of sulfur, 15 lbs.
Salt, 15 lbs.
Water, 50 gallons.

Slake the lime in a small quantity of hot water, gradually adding and thoroughly stirring in the sulfur. Dilute mixture with twelve gallons of water and boil in an iron kettle or cook by steam in a covered tank or barrel for one and one-half hour. Then add salt, continuing the boiling for one-half hour more. Fill vessel up with water to the required fifty gallons. Strain the wash through fine a mesh strainer and apply hot. In using an iron kettle keep the mixture vigorously boiling and thoroughly stirred to prevent caking and burning of materials. Wash cooked by steam is more easily prepared and better made. Apply the wash just as the buds begin to swell in the spring. Cover all parts of the tree with a heavy coat of the wash. The wash seems best adapted to orchardists who have not yet learned to use petroleum with safety or are afraid that their trees are beginning to show injury from the oil or will not stand many more applications of it. *It is especially recommended for the treatment of peach trees for San Jose Scale.*

It is believed that the substitution for the salt of one and one-fourth pound of blue vitriol dissolved in hot water results in a quicker acting wash. This formula is known as the Oregon Wash.

SEED AND SOIL TREATMENTS.

SEED OR PLANT	FOR WHAT TREAT'D	TREATMENT	METHOD OF TREATMENT
Barley	Smuts	Modified hot water	Soak seed enclosed in sacks four hours in cold water, let stand wet four hours more and dip five minutes in hot water at 130 degrees Fahr., or three degrees lower than for other hot water treatments.
Bean	Anthracnose	(See spray calendar)	
	Weevil	Bisulfid of carbon	Submit to fumes for twenty-four hours in air-tight vessel or chamber.
Begonia	Nematodes	Heat soil with steam	Disinfect soil to be used by heating with steam as described under cucumbers.
Cabbage and Cauliflower	Club root	Quicklime on soil	Apply stone lime (quicklime) preferably ground lime, before planting, at rate of 80 bushels per acre and work into the soil with suitable tools.
	Maggot	Bisulfid of carbon	Make hole in soil near roots, pour in about a teaspoonful of bisulfid of carbon and fill hole with soil.
Cucumber	Nematodes in hot-house	Heat soil with steam	Heat earth before using in special box for three hours with 60 pounds of steam or four hours with 40 pounds. (See Bulletin 73.)
Oats	Loose smut	Immerse seed in hot water. Soak seed in potas. sulfid. Sprinkle seed with formalin or copper sulfate	Immerse seed contained in open vessel for ten minutes in hot water at 132-3 degrees Fahr., for seven minutes at 136 degrees Fahr., or for five minutes at 140-2 degrees Fahr., spread at once to dry. (2) Soak seed in ¾ per cent. solution potassium sulfid for twenty-four hours with stirring, then dry. (3) Sprinkle a pile of seed to saturate with formalin or copper sulfate, one gallon to bushel; after three or four hours or over night in pile spread to dry. With copper sulfate use lime in drying. (See Bulletin 97).
	Insects in stored grain	(See wheat)	
Onion	Smut	Use formalin or ground quicklime. Plant other crop. Use sets or transplanted seedlings	Use formalin solution 1 lb. to 30 gals. of water sprinkled on seed in contact with soil and cover at once, or better sow with drill and drip attachment, the solution falling with the seed. Or apply ground quicklime at the rate of seventy-five to one hundred and twenty-five bushels per acre just previous to seeding on freshly plowed land, and stir into soil. (See Bulletins 122 and 131).
Potato	Scab	Soak uncut seed in formalin	Soak seed for two hours in formalin; then dry and plant on scab-free soil.
	Rosette (Rhizoctonia)	Soak seed as for scab	Soak seed as for scab; on infected soil use formalin after manner in onion smut. (See Bulletin 145).
Roses	Nematodes in hot-house	Heat soil with steam	Heat soil with steam as described above; thoroughly disintegrated soil from sod one year or more old, less dangerous. Lime water stimulates affected plants but is not a remedy.
Sweet Potato	Bin rot	Use flowers of sulfur in soil	Make dope one part flowers of sulfur and six parts earth; drop handful and set plant through it.
	Soil rot	Use flowers of sulfur	Same as above.
Tobacco	Root rot or black root	Plant beds on new soil	Avoid old plant bed soil.
Tomato	Nematodes in hot-house	Heat soil with steam	As for roses and cucumbers above.
	Point rot in hot-house	Mulch or sub-water	An insufficient water supply seems favorable to development of point rot of green tomatoes.
Turnip	Club root	Quicklime in soil	As for cabbage and cauliflower. Avoid succession of these crops.
Violet	Nematodes in hot-house	Heat soil with steam	The time for prevention is by soil treatment beforehand as for cucumbers above.
Wheat	Loose smut	Modified hot water	Soak seed four hours in cold water, let stand four hours more in wet sacks, immerse five minutes in water at 133 degrees Fahr. and dry.
	Stinking smut	Hot water, copper sulfate or formalin	Dip skimmed seed for ten minutes in hot water at 133° Fahr. and dry on disinfected surface, or immerse ten minutes in solution of blue vitriol (copper sulphate); dry with air slaked lime by shoveling. Use two pounds of blue vitriol to ten gallons of water. Grain may be sprinkled with copper sulfate or formalin, as for oats. (See Bulletin 97).
	Insects in stored grain	Bisulfid of carbon	Place one pound of bisulfid of carbon for each 2,000 pounds of grain in bins. Cover surface with blanket to hold the fumes which will spread through the mass, killing all insect life. Use in tight bins or buildings and do not use near fire of any description.

SPRAY CALENDAR.

WHAT TO SPRAY.	FOR WHAT TO SPRAY.	WITH WHAT TO SPRAY.	WHEN TO SPRAY.				REMARKS AND CAUTIONS.
			FIRST SPRAYING.	SECOND SPRAYING.	THIRD SPRAYING.	FOURTH SPRAYING.	
Apple	Bitter-rot	Soda Bordeaux or ammoniacal copper carbonate	With first appearance of rot	One to two weeks after first	Two weeks later	Not required if Bordeaux precedes	These follow Bordeaux for scab; **danger on fair skinned apples.**
	Scab	Bordeaux mixture I	As buds are swelling	Just before blossoms open	Just after blossoms drop	7 to 10 days later	
	Sooty fungus	Bordeaux I	After blossoms drop	Two weeks later	Same as for scab	Same as for scab	
	Bud moth	Arsenites in Bord	With opening of buds.				
	Canker worm	Arsenate of lead alone	With first young worms	2 or 3 days later if worms remain	Same as second		**12, 13, 14 or 18 in Bordeaux are not quite as efficient as arsenate of lead alone.**
	Codlin moth	Arsenites in Bordeaux I or arsenate of lead, 3 lbs. to 50 gallons	As soon as blossoms fall	7 to 10 days later	Same as for scab	Same as for scab. Arsenate of lead alone on light colored apples	
	San Jose Scale.	19 or 20	Late in winter or early in spring				Crude petroleum does not injure apple trees, but the lime, sulfur and salt mixture is quite as good.
	Oyster shell scale / Scurfy scale	Lime wash (1) / Kerosene emulsion (2) (or 20)	Early winter with (1)	June 10-15 with (2)			Don't use strong emulsion when trees are in full leaf.
	Woolly aphis	Kerosene emulsion	When trees are not in full leaf	In fall			
Aster	Blister beetle	Whale oil soap	When beetles appear				Use 1 pound soap to 6 gallons water.
Asparagus	Asparagus beetle	Lime or pyrethrum	Early spring				Do not use arsenites, except in late summer.
	Asparagus rust	Bordeaux I	After cutting crop	Ten days later	Ten day later	Ten days later	Repeat 3 to 4 times. **Burn** rusted brush in fall.
Bean	Anthracnose	Bordeaux I	Soak seed 1 to 2 hours in am. cop. carb. five times strength of 3	Bordeaux on 2 or 3 in. plants	Bordeaux ten days later	After blossoms	Repeat if needed.
Beet	Leaf spot	Bordeaux I	When plants are 5-6 in. high	Two weeks after first	Two weeks later		

SPRAY CALENDAR—CONTINUED.

WHAT TO SPRAY.	FOR WHAT TO SPRAY.	WITH WHAT TO SPRAY.	WHEN TO SPRAY.				REMARKS AND CAUTIONS.
			FIRST SPRAYING.	SECOND SPRAYING.	THIRD SPRAYING.	FOURTH SPRAYING.	
Cabbage and Cauliflower	Cabbage worm	Pyrethrum	With first appearance of worms	Whenever worms are observed			1 oz. to 30 gallons water, or dust 1 to 10 of flour.
	Club root	(See soil treatment)					
Carnation	Leaf or calyx mould	Bordeaux I or ½ of 6	Upon appearance of fungus	Two weeks later	Two weeks later	Repeat if needed	Begin early before the calyces are ruined.
	Leaf spot	Bordeaux I or ½ of 6	Upon appearance of fungus	Two weeks later	Two weeks later	Cover foliage well	
Celery	Leaf spot or leaf blight	Bordeaux I	On young seedlings	Repeat on seedlings	Before or after transplanting	Two weeks later	Keep leaves well covered in plant bed.
Cherry Stocks	Leaf spot	Bordeaux II	When leaves are half grown	Two weeks later	Two weeks later	About two weeks later	
Cherry	Leaf spot	Bordeaux II	When leaves are unfolding	Two weeks later	2 or 3 weeks after second		First after blossoming. Possibly necessary to treat after crop is gathered.
	Rot (?)	Bordeaux I and II	Before blossoming I	After blossoms drop, II on fruit	Two weeks later II on fruit	Two weeks later II, 3 or 4	Use 3 or 4 when fruit is large.
	Aphis	Whale oil soap	On first appearance of aphis				Difficult to reach aphis. Use 1 lb. soap to 4 gallons of water.
	Cherry slug	Arsenites in Bord. I.	When slugs appear	Repeat if slugs remain			Air slaked lime may be used.
	Curculio	Arsenites in Bordeaux I and II	Before blossoming in I.	As blossoms dry up in II	One week later in II		Avoid strong solutions. See 19
	San Jose Scale.	Whale oil soap solution or 20	Before buds open				
Cineraria	Mildew	Bordeaux I or ½ of 6.	When mildew appears in spring	Two weeks later	Repeat if necessary		
Chrysanthemum	Leaf spot	Bordeaux II or ½ of 6	July 1	Two weeks later	Repeat if necessary		

SPRAY CALENDAR—CONTINUED.

WHAT TO SPRAY.	FOR WHAT TO SPRAY.	WITH WHAT TO SPRAY.	WHEN TO SPRAY				REMARKS AND CAUTIONS.
			FIRST SPRAYING.	SECOND SPRAYING.	THIRD SPRAYING.	FOURTH SPRAYING.	
Cucumber....	Anthracnose...	Bordeaux I.....	When plants begin to vine.....	Two weeks later.....	Two weeks later.....	Two weeks later.....	Repeat as necessary.
	Downy mildew.	Bordeaux I.....	July 25 to August 1....	Eight to ten days later	Eight to nine days later	Eight days later.....	Repeat at weekly intervals
	Spot of fruit....	Bordeaux I.....	After first blossoms....	Ten days later.....	Two weeks after second	Two weeks after third	Apply to fruit carefully.
	Nematodes....	(See soil treatment)..	.....				
Currant.....	Leaf spot.....	Bordeaux I.....	As leaves are unfolding	Two weeks later.....	Two weeks later.....	Two or three weeks later.....	Four necessitates washing fruit. See 19.
	Plant bug.....	Kerosene emulsion...	May.....	Early in June if necessary			
	San Jose Scale.	Whale oil soap solution or 20.....	As with the apple.....	In spring as with apple			
	Worm	White hellebore.....	When worms first appear.....	In 3 or 4 days repeat..	Repeat as second.....	.....	Look for worms on under side of leaves first.
Gooseberry..	Leaf spot.....	Bordeaux I.....	As currants with leaf spot.....	As currants with leaf spot.....	As currants with leaf spot.....	As currants with leaf spot.....	This remedy is very successful
	Mildew	Bordeaux I or 7.....	Before leaves open I...	After blossoming I....	Potas. sulfid 2 weeks later.....	.....	Bordeaux coats fruit if used for 3rd. Sodium sulfid may be substituted for 7.
	Worm...	White hellebore.....	As on currants.....				
Grape.....	Anthracnose...	Bordeaux I.....	Just before buds open..	Just before blossoming.	Just after fruit has set	Ten days later Bord..	Don't spray after fruit is half grown.
	Berry moth...	Arsenites with Bordeaux I.....	.....	After fruit has set.....	Ten to fourteen days later.....	.....	Do not spray with arsenites after July 1st.
	Downy & powdery mildew..	Bordeaux I.....	Just before blossoming	After fruit has set.....	Ten to fourteen days later.....	.....	Covered by spraying for anthracnose or rot.
	Rot.....	Bordeaux I and 3 or 4	Just before blossoming Bordeaux I.....	Just after fruit has set I.....	Seven or eight days later.....	7 or 8 days later Bord. I	Follow by two or three sprayings with Soda Bordeaux or am. cop. carbonate.
	Leaf hopper....	Kerosene emulsion...	Before young can fly...				

SPRAY CALENDAR—CONTINUED.

WHAT TO SPRAY.	FOR WHAT TO SPRAY.	WITH WHAT TO SPRAY.	WHEN TO SPRAY.				REMARKS AND CAUTIONS.
			FIRST SPRAYING.	SECOND SPRAYING.	THIRD SPRAYING.	FOURTH SPRAYING.	
Horse Chestnut	Leaf spot or blight	Bordeaux I	When leaves are half grown	Two weeks later	Two weeks after second	Two to three weeks later	
Muskmelon	Anthracnose	Bordeaux I and II	In seed bed or when plants begin to vine Bordeaux II	Two weeks later Bord. I	Two weeks later	Two weeks later	Repeat as necessary; use II very early.
	Downy mildew	Bordeaux I	July 25 to August 1	Eight to ten days later	Eight or 9 days later	Eight days later	Repeat same.
	Leaf blight	Bordeaux I	When plants begin to vine	Three weeks later	Three weeks after second	Two weeks after third.	
Oat	Smut	(See seed treatment)					
Pea	Mildew	Bordeaux I	When mildew appears	Two weeks later	Repeat if needed		
Peach	Leaf curl	Bordeaux I, or 6	In fall, or March, Bord. I, 6 or 20	As buds are opening I, 6 or 20	Just after calyx drops, Bordeaux II	Not required, ditto 3d, if others are well done	Lime-sulfur-salt for first when scale is present instead of Bordeaux I
	Pustular spot	Bordeaux II	Just after calyx drops	Two weeks after first	Two weeks later		Cover fruit well.
	Rot	Bordeaux I and II	As buds are swelling I or 20	Just after calyx drops II	Three or four weeks later II	As fruit begins to color II	Every 7-10 days repeat. Destroy all mummies. 3 may be used 4th.
	Scab	Bordeaux I, 6 or 8	As buds are swelling Bordeaux I, 6 or 8	Just after calyx drops Bordeaux II	Two weeks later Bordeaux II, 8 or 9	Repeat third	
	Bud moth	Arsenites in Bordeaux I	With opening of buds				Use only half usual amount of poison.
	San Jose Scale	Lime, sulfur, salt	In winter or early spring				If 17 is applied. Use only in spring as buds are opening.
Pear Stocks	Leaf spot or blight	Bordeaux I	When leaves are half grown	Two weeks later	Two weeks later	Two weeks later	5 to 7 sprayings are needed.
Pear	Leaf blight	Bordeaux I & 3 or 4	Before blossoms open	Two weeks later, I or 3	Two weeks after 2nd	Bordeaux may make russet fruit	Use 3 for 3d, not Bordeaux after 2nd. Bordeaux after second may injure the fruit.
	Scab	Bordeaux I	When leaves are half grown	After blossoms drop			

SPRAY CALENDAR—CONTINUED.

WHAT TO SPRAY	FOR WHAT TO SPRAY.	WITH WHAT TO SPRAY.	WHEN TO SPRAY.				REMARKS AND CAUTIONS.
			FIRST SPRAYING.	SECOND SPRAYING.	THIRD SPRAYING.	FOURTH SPRAYING.	
Pear (Con)..	Bud moth.....	Arsenites in Bord. I.	With opening of buds..				
	Canker worm..	Arsenate of lead....					See apple.
	Codlin moth....	Arsenites in Bord. I.	As with the apple.....	Same as first..... ...	.....	.....	See apple.
	San Jose scale.	No. 20.....	In winter or early spring.....				
	Slug.....	Arsenites in Bord. I. or dust with slaked lime.....	When slugs appear....	Repeat if slugs remain			
Plum.....	Rot.....	Bordeaux I, also 3 or 4	As buds are swelling I or 20.....	Just after calyx drops I.	Three or four weeks later I.....	As fruit begins to color use 3 or 4.....	Every 7 to 10 days repeat 4th; useless to spray for rot, unless mummies are destroyed.
	Shot-hole fungus.....	Bordeaux I.....	When leaves are half grown.....	Three weeks later.....	Three weeks later if needed.....		
	Curculio.....	Arsenites in Bord. I.	With starting of buds.	Just after calyx drops.	Five days later.....	.....	Jar, gather and destroy curculios and stung plums in addition.
	Aphis.....	Whale oil soap.....	On appearance of aphis	.....	.....	.....	Use 1 lb. soap to 6 gal. water.
	San Jose scale.	No. 20.....	In winter or early spring.....				
Potato.....	Early blight...	Bordeaux I.....	When plants are 6 in. high.....	Two weeks later.....	Two weeks later.....	Two weeks later if needed.....	
	Late blight....	Bordeaux I.....	As for early blight to July.....	July 15—20.....	Two weeks later.....	8 to 10 days later.....	Repeat at 7 to 8 day intervals till crop is mature.
	Rosette.....	(See seed treatment).					
	Blister beetle..	Whale oi soap,... ...	When beetles appear..	Repeat if necessary....			Use 1 lb. to 6 gallons of water.
	Colorado beetle	Arsenites alone or in Bordeaux I.....	When beetles or young appear.....	As for first.....	.....	.....	Arsenate of lead, 3 lbs. to 50 gallons of water, for Colorado beetle alone.
	Flea beetle.....	Bordeaux I.....	When beetles appear..	Repeat if necessary....	As for first and second		

SPRAY CALENDAR—CONCLUDED.

WHAT TO SPRAY.	FOR WHAT TO SPRAY.	WITH WHAT TO SPRAY.	WHEN TO SPRAY.				REMARKS AND CAUTIONS.
			FIRST SPRAYING.	SECOND SPRAYING.	THIRD SP. AYING.	FOURTH SPRAYING	
Quince Stocks	Leaf spot	Bordeaux I	When leaves are half grown	About two weeks later	Two weeks later	Two weeks later	Perhaps 5th spraying will be needed.
Quince	Leaf spot	Bordeaux I	As buds are swelling	When leaves are half grown	Two weeks later	Two weeks later	Second should come after blossoms drop.
	Fruit and leaf spot	Bordeaux I	Before blossoms open	After blossoms drop	Two weeks after second	Two week later	
	San José Scale	No. 20	In winter or early spring				
Raspberry & Blackberry	Anthracnose	Bordeaux I and II	Before leaves open use I	II on young canes 6 in. high	Repeat second one week later		Keep spray from leaves on bearing canes.
	Leaf spot	Bordeaux I	When leaves are half grown	Two weeks later	Two weeks later		
	Saw fly	Pyrethrum or hellebore	As for currant worm	In three or four days repeat			
Rose	Leaf spot	Bordeaux I or ½ of 6.	With first appearance of fungus	Two or three weeks later	Repeat if necessary		Bordeaux shows on plants.
	Nematodes	(See soil treatment.)					
	Slug	Arsenites in Bord. II or hellebore	On appearance of slugs	Repeat if needed			
Sugar Beets	Leaf spot	Bordeaux I	With first appearance of spots	Two or three weeks later	Two or three weeks later	Three weeks later if needed	
	Blister beetle	Whale oil soap	When beetles appear				Use 1 lb. to 6 gallons of water.
	Flea beetle	Bordeaux I	When beetles appear				
Tobacco	Root rot	(See soil treatment)					
Tomato	Anthracnose	Bordeaux I	Soon after fruit begins to set	Three weeks later	Three weeks later		
	Leaf blight	Bordeaux I	Three weeks after transplanting	Three weeks after first	Three weeks later	Three weeks later	
	Point rot	(See soil treatment)					
Watermelon	Anthracnose	Bordeaux II	When plants begin to vine	Three weeks after first	Two weeks later	Three weeks later	
	Downy mildew	Bordeaux II	July 25 to August 1	Eight to ten days later	Eight to nine days later	As for cucumbers	Bordeaux I. Some danger.
	Leaf blight	Bordeaux II	As disease appears on muskmelons	Repeat as on muskmelons	As on muskmelons		

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